

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

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WRITTEN OPINION

(PCT Rule 66)

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REPLY DUE

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International application No.

PCT/EP03/00596

International filing date (day/month/year)

22.01.2003

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31.01.2002

International Patent Classification (IPC) or both national classification and IPC

H04L5/02

Applicant

MOTOROLA INC. et al

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application
3. The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 31.05.2004

Name and mailing address of the international preliminary examining authority:



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I. Basis of the opinion

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*):

Description, Pages

1-16 as originally filed

Claims, Numbers

1-27 as originally filed

Drawings, Sheets

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this opinion.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	1-3,7-13,16-21,24-27
Inventive step (IS)	Claims	4-6,14,15,22,23
Industrial applicability (IA)	Claims	

2. Citations and explanations**see separate sheet**

The following documents are referred to in this communication; the numbering will be adhered to in the rest of the procedure:

D1: BAUDAIS J-Y ET AL: 'AN IMPROVED LINEAR MMSE DETECTION TECHNIQUE FOR MULTI-CARRIER CDMA SYSTEMS: COMPARISON AND COMBINATION WITH INTERFERENCE CANCELLATION SCHEMES', EUROPEAN TRANSACTIONS ON TELECOMMUNICATIONS, EUREL PUBLICATION, MILANO, IT, VOL. 11, NR. 6, 1 NOV. 2000, PAGE(S) 547-554

D2: KALOFONOS D N ET AL: 'Performance of the multi-stage detector for a MC-CDMA system in a Rayleigh fading channel', GLOBAL TELECOMMUNICATIONS CONFERENCE. GLOBECOM '96. 'COMMUNICATIONS: THE KEY TO GLOBAL PROSPERITY LONDON, UK 18- 22 NOV. 1996, NEW YORK, NY, USA, IEEE, US, PAGE(S) 1784-1788

D3: BURY A ET AL: 'Block transmission equalizers using constrained minimum variance filters with application to MC-CDMA', VOL. 1, 06-08 SEPT. 2000, PAGE(S) 159-163

D4: HÉLARD J-F ET AL: 'Linear MMSE detection technique for MC-CDMA', ELECTRONICS LETTERS, IEE STEVENAGE, GB, VOL. 36, NR. 7, 30 MARCH 2000, PAGE(S) 665-666

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Claim 1 does not meet the requirement of novelty, Article 33(2) PCT.
- 1.1 Document D1 discloses, in terms of the wording of claim 1, a spread OFDM wireless communication system (see, e.g. page 548, left-hand column, first paragraph) comprising:
 - at a transmitter means for transmitting a spread OFDM signal (see, e.g. Figure 1);
 - at a receiver:
 - means for receiving the spread OFDM signal (see, e.g. Figure 1);
 - means for equalizing the spread OFDM signal (see, e.g. Figure 1, block 'Equalizer');
 - means for splitting the equalized spread OFDM signal into a first plurality of portions including a first portion and a second portion (see, e.g. Fig. 5);
 - means for making a decision on the second portion to produce a decided second

portion (see, e.g. page 551, right-hand column, second paragraph; Fig. 5 block 'Decision'; formula 17);


means for subtracting the decided second portion from the received spread OFDM signal to produce a first difference signal (see, e.g. page 551, right-hand column, second paragraph; Fig. 5); and

means for equalising and processing the first difference signal to recover the first portion of the received signal in which interference due to second portion interfering terms is substantially reduced (see, e.g. page 551, right-hand column, third paragraph; Figure 5; formula 18).

2. All the features of claim 1 are also disclosed by D2 (see, e.g. sections 2 and 3) and D3 (see, e.g. abstract; Section IV).

Therefore, claim 1 also lacks novelty vis-à-vis D2 or D3.

3. Independent claims 11 and 19 comprise the same features as system claim 1 but in terms of receiver features and method steps respectively. Therefore, the above objection of lack of novelty is also applied to these claims.

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4. The statement that the subject-matter of claims 1, 11 and 19 is inventive because teaches to subtract the decisions of one half from the received signal block before recomputing the modified received signal to improve the decisions of the other half cannot be taking into account in this opinion because this feature is not included in the independent claims. The applicant should note that the wording of the claims only includes "means for splitting the equalized spread OFDM signal into a first plurality of portions including a first portion and a second portion" without specifying the relationship between the portions and the received signal block and that due to this broad feature the disclosure of the prior art falls within the scope of the claim.

5. Claim 10 does not meet the requirement of novelty, Article 33(2) PCT.

- 5.1 Document D1 discloses, in terms of the wording of claim 10, a spread OFDM wireless communication system (see, e.g. page 548, left-hand column, first paragraph) comprising:

- at a transmitter means for transmitting a spread OFDM signal (see, e.g. Figure 1);
- at a receiver

means for performing minimum mean square error equalization (see, e.g. abstract; section IV) having: first matrix multiplication means for multiplying by a first diagonal matrix having elements dependent on channel coefficients (see, e.g. formulae 14 and 15 and paragraph below); and second matrix multiplication means for multiplying by a second matrix which is a subset of a Walsh Hadamard matrix (see, e.g. formulae 1 and 14).

6. All the features of claim 10 are also disclosed by D2 (see, e.g. Section 3), D3 (see, e.g. section IV. Spread transmission, matrix D and matrix T) and D4 (see, e.g. section MMSE equalisation per user, matrix G and matrix C).

Therefore, claim 10 also lacks novelty vis-à-vis D2, D3 or D4.

7. Independent claims 18 and 27 comprise the same features as system claim 10 but in terms of receiver features and method steps respectively. Therefore, the above objection of lack of novelty is also applied to these claims.
8. The applicant should also note that the scope of claims 10, 18 and 27 is also very broad and that the features of first matrix multiplication means for multiplying by a first diagonal matrix having elements dependent on channel coefficients and second matrix multiplication means for multiplying by a second matrix which is a subset of a Walsh Hadamard matrix can also be found in the disclosures of the cited prior art documents (see points 5 and 6 above).
9. The dependent claims do not contain any additional feature which, in combination with the independent claims, meet the requirements of novelty and inventive step. These features are either known from the cited prior art (claims 2, 3, 7, 8, 9, 12, 13, 16, 17, 20, 21, 24, 25, 26, see citations in the International Search Report) or are common measures (claims 4, 5, 6, 14, 15, 22, 23).
10. Claim 1 does not meet the requirements of Article 6 PCT for the following reasons:
 - 10.1 It is not clear due to the formulations "at a transmitter means for ..." and "at a receiver means for ..." whether the transmitter and the receiver are included in the scope of protection of the claim or not.

10.2 The expression "means for splitting the equalized spread OFDM signal into a first plurality of portions including a first portion and a second portion" is vague and also renders the scope of the protection unclear, because it is not clear what is meant by a "portion" and how the signal is portioned. The attention of the applicant is drawn to this broad expression because it includes many embodiments not disclosed in the description and it should be clarified in the light of the description.

10.3 The expression "in which interference due to second portion interfering terms is substantially reduced" attempts to define the subject-matter in terms of the result to be achieved and thus the matter for which protection is sought is not clearly defined. The technical features necessary for achieving this result should be added in more concrete terms, viz. in terms of how the effect is to be achieved. Similar expressions can also be found in claims 2-5, 11-15 and 19-23.

11. It is clear from the description that the feature of the multi-resolution decoding algorithm by splitting the equalized vector and subtracting the interference generated by one of the parts is essential to the definition of the invention.

Since independent claims 10, 18 and 27 do not contain these features they do not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

12. Claims 1 and 10 directed to a system, claims 11 and 18 directed to a receiver and claims 19 and 27 have been drafted as separate independent claims.

These claims appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness. Moreover, lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.

Hence, claims 1, 10, 11, 18 and 19, 27 do not meet the requirements of Article 6 PCT.

In order to overcome this objection, it would appear appropriate to file an amended set of claims defining the relevant subject-matter in terms of a single independent claim in each category followed by dependent claims covering features which are merely optional (Rule 6.4 PCT).

13. The following requirements should also be met:
- 13.1 If new independent claims are filed, they should be in the two-part form as required by Rule 6(3)(b) PCT, whereby the features already disclosed in document D1 should be placed in the preamble.
- 13.2 To meet the requirements of Rule 5.1(a)(ii) PCT, the document D1 should be identified in the description and its relevant contents should be briefly indicated.
- 13.3 When filing amended claims the applicant should at the same time bring the description into conformity with the amended independent claims (Rule 5.1(a)(iii) PCT).
- 13.4 In order to facilitate the examination of the conformity of the amended application with the requirements of Article 34(2)(b) PCT, the applicant is requested to clearly identify the amendments carried out, irrespective of whether they concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based.

If the applicant regards it as appropriate these indications could be submitted in handwritten form on a copy of the relevant parts of the application as filed.